

The Relationship Between Undernutrition and Mortality in Critically ill Patients : A Literature Review

Dahniar Rose^{a,b}, Arina Setyaningtyas^c, Nur Aisiyah Widjaja^c, Bambang Pujo Semedi^d

^a dahniar.rose-2020@fk.unair.ac.id

^bMedical Program, Faculty of Medicine, Airlangga University, Surabaya 60132, Indonesia

^cDepartment of Pediatrics, Faculty of Medicine, Universitas Airlangga, Dr. Soetomo General Hospital, Surabaya, Indonesia

^dDepartment of Anesthesiology and Reanimation, Faculty of Medicine, Universitas Airlangga, Dr. Soetomo General Hospital, Surabaya, Indonesia

Abstract

Background: Nutritional status in children is an indicator to find out whether a child is are stunted, wasted or severely wasted, or are underweight or severely underweight underweight. Undernutrition in critically ill patients aged 0 – 5 years is closely related with mortality. Due to other disease factors that exist in critically ill patients thereby inhibiting children's growth and reducing the quality of life in children with undernutrition. Although various ways are taken to improve nutritional status in children aged 0 – 5 years, the incidence of mortality remains with malnutrition in Indonesia remains high. The aim of this research is to find out. The relationship between undernutrition in critically ill patients and mortality at the Pediatric Intensive Care Unit (PICU) as well as a means of increasing knowledge between malnutrition and mortality. Providing nutrition to critically ill patients with undernutrition is very important to prevent even more severe undernutrition. Undernutrition in critically ill patients, especially in children aged 0–5 years, will affect the child's future growth and development. And intensive care in the PICU can also influence the high mortality rate in children aged 0-5 years.

Keywords : Critically ill, Undernutrition, Under-Five Development, Mortality, PICU

Introduction

Critically ill patients are at high risk of experiencing undernutrition due to their own congenital illnesses combined with inadequate care in intensive care. Low nutritional status in critically ill patients can cause the body to become weak and susceptible to disease. So it can cause interference with the child's growth and development. If this does not receive further treatment, it will get worse and can lead to death. In critically ill children, low nutrition is caused by multifactorial factors. The presence of congenital diseases also worsens the prognosis of critically ill children. The result data on patient mortality with undernutrition with a total inclusion criteria of 71 patients aged 0-5 years, with a death rate of 32 and 39 patient alive. With three categories namely, stunted, wasted, and underweight, all three of which are categorized as undernutrition and are associated with with mortality. Most of them have a low body weight and are accompanied by congenital diseases ranging from infectious, non infectious and congenital disorders (Julia et al., 2019).

Undernutrition patients have a mortality rate that is large enough to influence the mortality rate in children under five (AKABA), which has a significant influence on changes in survival. Children, especially toddlers, are more susceptible to diseases that are accompanied by undernutrition and can cause increased mortality rates and will affect the physical, mental condition and level of intelligence of children due to long-term disruption of brain cells. The PELOD score (Pediatric Logistic Organ Dysfunction Score) is used to determine the degree of organ system dysfunction in patients in the PICU so that patients receive intensive care and nutritional requirements (Dewi P et al., 2018).

The cause of the high mortality rate in critically ill patients in the PICU is undernutrition which is caused by several factors, such as lack of nutrition, associated with inflammation related to a disease which causes a reduction in body composition (Cederholm.T et al., 2019). There is research that shows that undernutrition has a relationship against other diseases such as pneumonia, diarrhea and other related diseases (Secker and Jeejeebhoy., 2007). One study evaluating nutritional status at PICU admission was associated with poor outcomes. Cohort studies say that nutritional status should be determined in all children in PICU to target optimal nutrition aimed at preventing further nutritional damage (Loji J et al., 2017).

Method

This research had a retrospective cohort study by looking at the medical records of PICU patients at Dr. Soetomo, case control design Low nutritional status in critically ill patients with mortality. The risk factors investigated were stunting, wasting, underweight, infectious disease, non – infectious disease, gender, and mortality.

Result

No.	Title	Author	Objective	Design	Sampling	Main Finding
1.	Identifying Critically Ill Patients at Risk of Malnutrition and Underfeeding: A Prospective Study at an Academic Hospital	(Fatemeh et al, 2019)	Analyze the relationship between the diversity of undernutrition and mortality in critically ill patients	Cross sectional	150 children (0-5 years old)	The mortality rate and underfeeding contributed significantly to more mortality rate both in ICU and hospital (95.7% versus 4.3%, $P = 0.005$ and 94.6% versus 5.4%, $P = 0.003$, respectively).
2.	Characteristics and predictors of outcomes of critically ill children with SARS-CoV-2 infection - the PICU experience	(Maha et al, 2022)	Analyze the relationship between the diversity of undernutrition, mortality and infectious disease in critically ill children.	Cross sectional	61 children (1-12 years)	The proportion of patients with under-nutrition, presence of comorbidity, coinfections were significantly higher in children with unfavorable outcomes (p-value, 0.04, 0.003 and 0.039, respectively). Fever duration was significantly longer among children in Group B (10.74 \pm 8.96 vs 6.49 \pm 4.04, $p = 0.025$). Clinical presentation like respiratory distress, shock, and GCS < 7 at admission was associated with worsened prognosis.
3.	Factors affecting malnutrition in children and the uptake of interventions to prevent the condition	(Edem et al, 2015)	To determine the relationship between malnutrition in children and uptake interventions to prevent the condition and the incidence mortality in critically ill children.	Cross sectional	371 children in ghana (1-12 years old)	In the multivariate analysis, children who had low birth weight (Adjusted OR, 2.65 [95 % CI, 1.09-6.45], $p = 0.032$)

4.	Undernutrition in critically ill child	(Yara et al, 2020)	To describe the malnutrition in PICU	Qualitative descriptive	Case control	Malnutrition remains a leading cause of childhood mortality. According to the Global Burden of Disease Study 2013, the number of deaths for protein-energy malnutrition, age-standardized, was 9.8/1,000,000 in children.
5.	Nutrition for critically ill children with congenital heart disease	(Koen et Verbruggen, 2022)	To inform whether providing parenteral nutrition can reduce the mortality rate in critically ill patients	Quantitative describe	Children in hospital	Children in Different Phases of the Stress Response in hospital.
6.	Mortality and morbidity patterns in under-five children with severe acute malnutrition (SAM) in Zambia hospital-based records (2009–2013)	(Tendai et al, 2015)	To inform case mortality and morbidity in critically ill children	retrospective review	Medical records 2009-2013	Clinical and mortality data which was extracted on all children aged 0–60 months

Discussion

In the study of Yara et al (2020) it shows that undernutrition in children is closely related to the incidence of mortality. There are many things that can worsen nutritional status and can cause mortality. Such as pre-existing illnesses in the child, social care, care in the PICU and support from people around him. One example of a causal factor that can worsen the status of critically ill patients is congenital heart disease. Parenteral feeding is a crucial aspect of care for critically ill individuals who also have congenital heart disease. When treating critically ill children, nutritional support plays a crucial role, and the stage of the disease must be considered. Severe catabolism is a characteristic of the metabolic stress response during acute critical disease. So far, there is no evidence that the acute catabolic state can be prevented with nutritional support. The Pediatric 'Early versus Late Parenteral Nutrition' (PEPaNIC) trial showed that withholding supplemental parenteral nutrition (PN) during the first week in critically ill children, when enteral nutrition was not sufficient, prevented infections and shortened the stay in the Pediatric Intensive Care Unit (PICU) and the hospital. Providing this nutrition is believed to reduce the mortality rate in critically ill pediatric patients in the PICU. Currently, the mortality rate for critically ill pediatric patients aged 0-5 years in the world has reached 25 to 35 million. And 13 million deaths are affected by undernutrition. In the study of Larasati et al (2022), in comparison to patients without anemia, those with anemia also exhibited worse nutritional status and higher organ dysfunction ratings.

Conclusion

Many studies show that low nutritional status in critically ill pediatric patients dominates the mortality rate every year, especially in developing countries like Indonesia. There are many factors that can worsen the incidence of undernutrition, especially care in the PICU and existing illnesses in the patient.

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